about their financial futures. To do so the user needs a financial tool that approaches modeling from an executive decision-making perspective.

Traditionally, individuals investors had to rely on an investment advisor to manage their investment portfolio. Although an investment advisor is a valuable ingredient in helping the user achieve his prospective financial goals, investment advisors can be very expensive. In fact, investors who traditionally use a personal fund manager or advisor generally have portfolios in excess of several million dollars. An advisor spends a great deal of his expensive time in ascertaining the user's goals, market attitude, preferences and risk tolerance. The advisor then accumulates all the financial information regarding the user and model his investment portfolio. A thorough investigation is required in order to dispense good advice taking the user's tax liability, life style, expenses or unforeseen events into account as well as the user's financial goals. This process is expensive and thus an unavailable option for the majority of investors.

Furthermore, the availability and access to a human advisor may be less than ideal. A human advisor need sleep, get sick, takes vacations, etc.

In view of the forgoing, systems and computer methods are needed to automate many of the functions traditionally performed by live advisors. Automated financial coaching would therefore reduce costs, and make financial advising more accessible to individuals of more modest means.

SUMMARY OF THE INVENTION

The present invention provides automated coaching to a user within the framework of a financial counseling and modeling system. The automated coaching alerts and focuses the user attention to the issues to be addressed, and frames decisions to be made. The automated coaching helps focus the user's attention to specific problems and in many cases is able to provide specific solutions to those problems. The automated coach uses natural language coaching strings to dispense its analysis to the user.

In general terms, the present invention relates to a financial management system for providing personalized financial advice to a user. A service level subsystem allows the user to negotiate a service level agreement that defines the user's desired level of support and limits access to user provided information. The modeling subsystem aggregates the user's financial information such as the user revenue and expense expectation over a defined period of time. The

advice generating subsystem is coupled to the service level subsystem and includes one or more coaching engines that dynamically analyze the financial needs of the user in accordance with the user's inputted financial and investment profile. Furthermore, the automated coaching engine provides customized financial coaching tailored to the user's life intentions.

Furthermore, the financial modeling and counseling system models the user's investment portfolio. The model develops a profile based on the user's personal investment parameters and provides him with automated customized coaching to help the user better conform his investment portfolio to his investment profile. The automated coaching further analyses the user's investment portfolio, and offers customized coaching to improve the user investment portfolio growth while reducing its financial risk. The present invention further benchmarks the user's portfolio against market indices and projects its prospective performance based on the user's profile and his targeted goals.

These and other advantages of the present invention will be apparent upon a study of the following descriptions and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other aspects and advantages are better understood from the following detailed description of a preferred embodiment of the invention with reference to the drawings, in which:

Figure 1 illustrates a representative system architecture in accordance with a preferred embodiment;

Figure 2 is a block diagram of an automated coach of the present invention;

Figure 3 is a block diagram of a representative hardware environment in accordance with a preferred embodiment;

Figure 4 is a block diagram of a financial management system of the present invention;

Figure 5 represents an embodiment of the client side software implementation and the server side software implementation;

Figure 6 is a block diagram of an exemplary data flow within the financial management system;

Figure 7 is an illustration of an investment portfolio generator web page interface;

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Figure 8 is a flow diagram of an operation of the Investment Portfolio generator in accordance with a preferred embodiment;

Figure 9 is a flow diagram of how to set risk tolerance;

Figure 10 is a flow diagram of an illustration of coaching generated related to the risk tolerance operation;

Figure 11 is a flow diagram of how to set investment style operation in greater detail;

Figure 12 is a flow diagram of how to set Bull/Bear attitude;

Figure 13 is a flow diagram for setting personal financial parameters;

Figure 14 is a flow diagram for computer generated setting of an asset mix.

Figure 15 is a flow diagram for modeling an existing portfolio; and

Figure 16 is a flow diagram of how to rebalance a portfolio.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 is an illustration of one embodiment of a financial management information system, in accordance with the present invention, for providing personalized financial advice in a collaborative computing environment. The term "coaching" in these patents is used to describe the limited analysis/feedback provided by automated rules-based coaching. In figure 1, financial management system 100 includes a financial coaching system 102 connected through the Internet 104 to a live advisor terminal 106 and a user terminal 110. The Internet is based on the TCP/IP communication protocol first developed by the Department Of Defense in the 1960s. The present invention may be implemented using any other protocols and many other networking system, including wireless networks, the Network File Service (NFS) protocol used by Sun Microsystems or a Novel network based on the UDP/IPX protocol.

Preferably, the financial coaching system 102 communicates with the user through any number of devices such as handheld wireless personal organizers, pagers, cellular telephones, land telephones and regular desktop computers. All of the above equipment can act as a user terminal 110. The financial coaching system 102 includes the automated coaching system 114 that dispenses natural language, textual coaching to the user at the user terminal 110

The user (e.g. individuals or company representative seeking financial advice) may access the system using a user terminal 110 (e.g. personal computer). A typical user computer terminal would be described in more detail in figure 3. The user computer is preferably

equipped with software to receive live streaming video and/or still pictures over the Internet **104,** from the advisor video camera **108.** Preferably, the user terminal **110** is further equipped with a video camera **109** and software to transmit live streaming video and from the user, across the Internet **104** to the live advisor at the advisor terminal **106.** Access to the live financial advisor **106** and all other services provided by the Financial management system is controlled and channeled through the Financial coaching system **102.** The user can access the financial coaching system **102** through the Internet **104** or by telephone **112.** A user telephone call is channeled through a call center discussed further subsequently in Figure **4** to the Financial coaching System and to the live advisor **106.**

The live advisor terminal **106** is preferably equipped with the video camera **108** for transmitting live streaming video. The live advisor **106** may further communicate with the user via a telephone **113.**

Figure **2** is a detailed diagram showing the data and processes relating to the automated coach **114** of the present invention. Advice engine **114** includes an input section **116,** a processing section **118** and an output section **120.** Input section **116** includes the typical input information to be supplied to automated coach **114.** In a preferred embodiment, input section **116** includes life path model data **122,** user financial information **124,** external market data **126,** as well as user interaction data **266.** Life path model data **122** can be, for example the output data from the LifePath model further described in a related application titled, A Financial Planning and Counseling System Projecting User Cash Flow with attorney docket number AND1P758, by the same inventors as the present application, and filed on the same day as the present application and herein incorporated by reference. The LifePath model aggregates the user life intentions into a cash flow model over a desired period of time. The user life intentions include revenue intentions and expense intentions. Once the aggregated model is formed possible period of cash shortage are highlighted and user is focused on possible solutions. The LifePath Model data **116** generated from the user interactions with the LifePath model is used as input to the coaching engine **114.**

User financial information **124** includes static financial information provided by the user as well as dynamic financial information maintained by third-party financial institutions. This can include such information as the user's various accounts at other financial institutions, as well as inputs from other financial programs such as Quicken® or MS Money®. External market

data **126** includes market data relating to the product choices available to the user. The financial institution offering the service may use the automated coaching engine **114** to offer to the user specific financial products pertinent to the user's situation. This information may include other institutions products and the coaching engine **114** may be used to obtain information from those outside sources. User interaction **128** includes information gathered based upon the user's interaction with the system. This may include a user profile used by a web server to customize a web page to the user's needs.

Processing section **118** illustrates the typical processing modules required for the coaching engine **114**. In one embodiment of the present invention, coaching engine **114** configures and optimizes **130** the features of products available to the user. For example, a bridge loan product suggested to the user as a possible solution to a cash shortage problem, may be packaged as fixed rate loan or as a variable interest loan. Furthermore, different Annual Percentage Rates (APR) and different initial costs may be offered as alternatives for each loan product. The automated coaching **114** may be used to configure optimize the features of this product. Similarly, processing section **132** performs the calculations relating to the potential products available to the user in accordance with the input data summarized in input section **116**. In the case of the previous example of the bridge financing, the automated coaching **114** may calculate the user's monthly payments. Furthermore, processing section **118** includes a regulatory requirements module **134** that provides the necessary processing to ensure that the advice generated by the coaching engine **114** complies with applicable government regulations. For example, a consumer loan may have different maximum interest rates in each state. The automated coaching **114** can check for these discrepancies.

Output section **120** includes the typical output elements from the advice engine **114**. For example, the coaching engine **114** can provide coaching **136** which provides the user with reasoned financial advice and product recommendations. The coaching engine presents its analysis and advice in natural language in simple and easy to understand manner. Product configuration **138** provides the user with a product recommendation in addition to the specific product information tailored to the user's needs. Similarly, the output section **120** can assess the impact **140** to the user's financial health.

Coaching is preferably done in a rules- based "if-then-else" structure which models a distinct domain of financial services. While many modelers produce numerical output, these

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coaches output syntactically and semantically correct natural language. Of course, other techniques are also suitable, as will be appreciated by those who are skilled in the art.

The distinction between coaching and advice is important. Advice recommends specific buy/sell activities. Coaching, on the other hand, alerts the customer to issues which need to be addressed, frames decisions which need to be made, signals customers when certain strategic conditions obtain. Of course, there is a gray area between advice and coaching but , in general, advice and coaching are considered to be distinct activities.

Figure **3** is a computer system architecture that can be used in implementing the present invention. This computer system architecture may be used to implement a user workstation, or any of the servers called for in figure **4**. Alternatively, other computer system architectures are suitable as well. The present invention may be practiced on any of the personal computer platforms available in the market such as an IBM™ compatible personal computer, an Apple Macintosh™ computer or UNIX™ based workstation. The operating system environment necessary to practice the present invention can be based on Windows™, NT™, UNIX™, Apple Operating System™, Solaris™ or open source operating system software such as Linux™ and Apache™. Furthermore, the computer system can support a number of processes. As appreciated by one skilled in the art, the processes may be written in any of the available programming languages including object oriented programming languages such as Java ™ or C++.

The computer system architecture **141** of figure **3** includes of a central processing unit **142**, such as a microprocessor, a read only memory (ROM) **146,** a random access memory (RAM) **148,** an input and output adapter **150**, a storage device **152**, and interface **154** connecting a plurality of input and output device such as a keyboard **156**, a mouse **158**, a speaker **160**, a microphone **162**, a video camera **164,** a display **168**, and a system bus **144** interconnecting all the components together. The computer may also include such devices as a touch screen (not shown) connected to the bus **144** and communication adapter **166** such as a dial up modem, a Digital Subscriber Line (DSL) modem or a cable modem, for connecting the workstation to the Internet **104**. The storage device **152** can be any number of devices including but not limited to hard disk drive, a floppy drive, CD-Rom, DVD, and a tape device, and removable magnetic storage devices such as a Jazz™ drive or ZIP™ drive. There are therefore a number of computer

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readable media encompassed by system **141**, including but not limited to RAM **148**, ROM **146**, storage device **152**, and storage accessible over the Internet **104**.

Figure **4** is a block diagram of an implementation of the financial coaching system **102**. The user may access the system through the Internet **104** and through a firewall server **170**. A Web server **172** provides the user with a personalized website providing an interactive interface between the user, the financial coaching and financial management system **102**. The financial coaching system **102** further includes of a mail server **174**, an application server **176**, a call center **178** and a data server **180**, all connected to the local area network **182**. The local area network (LAN) **182** may be any wide area intranet system or a global area network such as the Internet.

Security is important in any financial system. The firewall server **170** controls the access to the financial coaching system. The purpose of a firewall server is to prevent access to the system by unauthorized users and it would be appreciated by one skilled in the arts. Firewall servers are available through a variety of vendors and have become a standard feature of any secure system used as the primary defense against intruders and hackers.

The web server **172** provides a personalized interactive web page environment for the user to operate in once he accesses the system. The web page is acting as the web interface between the financial system   Web pages are created using the Hyper Text Markup Language (HTML) and scripting languages such as Java Script™ or Pearl™ as well as Java ™ applets. Creation of customized web page using any of the above programming languages is well within the scope of one skilled in the arts. The personalized web page provides an environment and an interface for the user to interact with the financial coaching system **102**. As an example, in one embodiment of the present invention, by selecting an appropriate icon from the interactive personalized website, the user is able to learn, plan, decide, transact and monitor his financial model.

The mail server **174** handles electronic mail communication between the user and the financial coaching system **102**. The Mail server **150** may operate using any standard protocol such as Simple Mail Transfer Protocol (SMTP) and it is implementation is within the scope of the knowledge of one skilled in the art.

The various modules of the financial advising system may reside on the application server **176**. The modules may include the various coaching engines, the LifePath modeling and

the portfolio modeling sub-systems. The applications may be implemented in many programming languages, including the object oriented programming languages such as C++ or Java™ and be based on any platform such as UNIX™, Apple OS ™ or Windows™ and NT™. In one implementation of the present invention, all or some of the modeling tools as well as all or some of the automated coaching engines reside on the application server **176**.

Alternatively, the user may also interact with financial coaching system **102** using a telephone **184**. The user's call is channeled through the call center system **178**. The call center **178** includes an Automatic Call Distributor (ACD) server **186**, an Interactive Voice Response Server (IVR) **188**, a Computer Telephony Integration (CTI) server **190** and a Relationship Manager (RM) workstation **192**, all interconnected through the Local Area Network or intranet **194**. The local area network **194** may also be used in interconnecting the various servers of call center. When the user calls into the financial advising system **102** using a remote telephone **184**, the IVR sever **188** receives the user's telephone call. The IVR system greets callers, prompting them for identification, and providing some information automatically. The Automatic Call Distributor (ACD) server **186** distributes the call using the Internet Protocol (IP) over the network, to the appropriate live coach. The Computer Telephony integration server (CTI) **190** acts as the link between the live advisor's telephone call and the workstation based applications and allows them to automatically work together. As an example, when the IVR server **188** obtains some information about the calling user, this information is delivered to the live advisor's workstation **106**, so the advisor does not have to request the same information again. Once the telephone call is properly routed to the live advisor, the user can user other means of communication such as electronic mail or white board ™ simultaneously while he is interacting with the live advisor.

The Data server **180** stores user input data and supplies the application Server **176**. The data server **180** may physically reside on many servers and includes outside databases from which the financial advising system **102** can draw information such as actuarial data such as historical price data on securities from sources such as Reuters, user financial information such as banking and portfolio information in other financial institution, and market information such as the days closing numbers for various market indices as well as individual stock securities pricing information. Formatted in the Open File Exchange (OFX) format, now the accepted internet standard used by programs such as Quicken™ and MS Money ™ the data server through

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the firewall can easily exchange information with the outside world and specifically the user. Furthermore, on the data server **180** may reside the coaching engine rules for various coaching engines **114** can reside data server **180**.

It should be noted that various computing platforms could be used to access the financial management system of the present invention. For example, a networked personal computer environment, a client-server system, a mainframe terminal environment, WEB TV terminal environment, dumb terminal environments can be used to access the financial management system of present invention. Depending upon the user's needs, a client-server system may be the most preferable computing system for implementing the financial system of the present invention.

Furthermore, the representation of each server such as an application server or a data server is a logical representation. The actual physical systems may be distributed over many servers, or be included on a single machine.

Figure **5** illustrates embodiments of the client side software implementation and the server side software implementation. On the client side, the client browser **196** is running on the user terminal **110**, and on the server side the server operating system software **198** may be running on any of the servers depicted in Figure **4** such as the web server **172** or the application server **176**. In other embodiments of the present invention both the web server and the application server may be residing on the same physical computer. In another implementation of the present invention, the two servers may be located on separate machines.

The client browser **198** opens and interprets a web page **200** written in for example, Hyper Text Markup Language (HTML). On the web page **200** various selections would allow the user to communicate with the web sever **172** and the application server **176** and allows the user to request information, or run applications. On the server's side, the user's request is received through Active Server Pages (ASP) **202,204, 206**. Each user request may triggers a server-side script that would launch an application.

In one embodiment of the present invention, when the user selects automated coaching in the automated coaching dialogue box **208**, a request is sent through the Internet using HTTP protocol **210** and launches the script for the ASP **202** tied to an Application Programmer's Interface **212**. The Application Program Interface (API) **212** processes the script and launches a

Configurator **214**. The coaching engine rules database **216** provides the coaching engine rules to a Configurator **214**.

The Configurator **214** is a scalable configuration and recommendation system made by Calico Commerce Inc. of San Jose, California. The coaching engine dispenses context sensitive coaching to the user regarding his financial situation. The Calico Configurator **214** is a generic engine capable of being configured and customized to suit specific uses. The coaching engine rules **216** allow customization to implement aspects of the present invention.

In another embodiment of the present invention, the user may elect to complement the automated coaching with advice from a human advisor. The availability of such services may be based on user negotiated service level agreement. The user contacts a live advisor by selecting from one of the many communication options available to him such as live voice **220**, live video **222**, online chat **224** or collaboration **226** to communicate with a live advisor **106**. The communication is preferably established through the ASP **204** linked to the ACD server **186** and which in turn launches the ASP **206** linked to a live advisor terminal **106**. The communication session may be managed by MS NetMeeting™ **228**, a software available from Microsoft® corporation.

Preferred implementations of the automated coaching dialog **208** and the live coaching communication manager **217** are further described in the related U.S. applications titled A Financial Planning and Counseling System Projecting User Cash Flow with Application Serial No. 09/705,288, Financial Modeling and Counseling System, Application Serial No. 09/705,154, Communication Interface For A Financial Modeling and Counseling System, Application Serial No. 09/705,290, and A User Interface For A Financial Modeling System, Application Serial No. 09/704,838, and Financial Portfolio Risk Management, Application Serial No. 09/705,287, all by the same inventors as the present application, and all filed on the same day as the present application and all herein incorporated by reference.

In another embodiment of the present invention, the user may select a function icon such as an interactive control of a model such as the LifePath model. The user's request is coded in a Java applet **230** which runs on a Java Virtual Machine **232**. The selection launches a connection through the network to the database **124** holding user financial information and profile. The user can then manipulate this information while connected to the database **124**.

In yet another embodiment of the present invention, the user can receiving live streaming audio or live streaming video **242** through the network residing on the IIS server's **238**. On the user side an application such as MS Windows ™ Media Player™ **240** would interprets and allows the user to see or hear the data.

Figure **6** is an illustration of the data flow within the financial management system **102**. A user using financial computer **110** preferably connects to the Financial coaching system **102** using the Internet **104**. The user at a user terminal **110** enters the Financial coaching system **102** at the service level subsystem **250**. The service level agreement provides the level of services to which the user is entitled. Once the user has negotiated a service level agreement **252**, he is prompted to select the model to be used in operation **254**. In an embodiment of the present invention, the level of service and support selected in the service level agreement **250** controls the user's access to different modeling tools.

In a preferred embodiment of the present invention the LifePath model **256** may be the hub of the financial institution's relationship. The LifePath model 256 provides data to all coaching engine **114** allowing customized coaching output to be dispensed to the user based on his unique financial situation. The LifePath model **256** combines all the pertinent financial information about a user in one coherent and comprehensive picture and models the user's life intentions into an aggregated cash flow system over a user selected period of time. Using the terminal **110** the user inputs his life intentions in terms of projected income and expenses. The LifePath model **256** maintains an interactive dialog between the user and financial management system **100**. The LifePath model **256** integrates the financial information available about the user in accordance with the user's service level agreement **252** to create an aggregate forecast of cash flow over the user's lifetime. The financial information available about the user includes the user's life intentions data **258** and the user's external financial data **260**. In a preferred embodiment of the present invention, the user's external financial data can include current checking account information from the user's bank or data related the user's 401K plan. By incorporating external data **260** into the LifePath model **256**, the system is capable of dynamically analyzing the financial needs of the user and providing the user with an understanding of their financial health at any point with minimal input form the user. As discussed above, personalized service level agreement **250** can optionally allow the user to limit the system's and/or advisor's access to the user's external financial data **260**. The external data

260 and the user's life intentions data combine to form the user information 124 used by the coaching engines 114.

Additionally, life path model 256 also integrates external market data 126 into the aggregated forecast of the user's cash flow. In one embodiment of the present invention, external market data 126 includes information such as current mortgage interest rates or market inflation rates. Access to both internal and external databases is controlled by the user's service level agreement.

Alternatively, the user may by pass the LifePath model 256 and start with the portfolio modeling tool 262. The service level agreement determines the level of service to which a user has agreed. The user would supply his financial portfolio information to the financial advising system 102, either directly using the user terminal 110 or indirectly through the Internet 104, by accessing a multiplicity of databases 258, 260 and 126 and accessing information such as his securities portfolio at a particular brokerage firm.

The financial portfolio modeling tool 262, is an interactive tool that has access to the all the information available to the LifePath model 256, such as the user's life intentions data 258, the user's external financial data 260, as well as external market data 126. User insight data 264 and aggregated data from the LifePath model 122 is also available to the portfolio modeling tool. As a result the user has little to input and may start using the portfolio model 262 very quickly without the need to do a lot of tedious data input. The financial portfolio modeling also allows the user to access a computer coach and/or a live advisor based in part on the service level agreement. An alternative embodiment allows the user to use the LifePath model 256 and set his long term financial goals and then use the portfolio modeling tool 262 to adjust his investment portfolio to better achieve his long term financial goals.

Coaching generating subsystem 266 includes one or more coaching engines 268. Coaching engines 268 dynamically analyze the financial needs of the user in accordance with the user's service level agreement. Furthermore, the coaching engines 268 are configured to operate with coaching engine rules repository 216. Coaching engine rules repository 216 is a collection of rules-based business logic that produces clear automated advice.

In an embodiment of the present invention a compound growth factor is calculated for the user's portfolio, by logarithmically averaging the portfolio's growth over the selected period of time as shown by the risk/reward map. The user is given an estimate as to the chances of

achieving a user inputted target value and natural language coaching analysis compares the user's portfolio to the various market benchmarks, by comparing the and suggest possible ways of reducing risk and increasing return on the investment. In another embodiment of the present invention, the market comparison is done by calculating a Value At Risk (VAR) and a Beta value for the portfolio and compare these figures to that of the market. The analysis is based on business logic rules and industry accepted statistical and numerical analysis. However, calculated statistical parameters presented numerically without context will be meaningless to the average investor. So statistics will be interpreted by rule based coaching algorithms, which states the results in non-technical natural language. Table 1 shows a sample of some interpretive coaching in response to user questions.

TABLE 1

Investor question	Logical test or calculation	Sample coaching
"How can I tell how well my portfolio is doing amidst all the daily ups and downs?"	Logarithmic curve fit to historical portfolio time series data	"On average, your portfolio was worth an estimated $180,000 one year ago, and about $200,000 today. It has grown at the rate of 11%. Average annual growth over 5 years is 9%. This includes brokerage costs and the amounts of money you invested or cashed out.
"How much of my portfolio growth has been due to market changes and how much to new capital investment and withdrawals?"	Logarithmic curve fit to historical data, adjusted for capital inflows, outflows and commissions, etc.	"When the effects of capital inflows, outflows and brokerage expenses are removed, your net growth has been an estimated 9% over the past year. Estimated average *Return On Investment* is 7% over the last 5 years."
"How good is this growth compared to the market?"	Comparison of net average growth to user-selected benchmarks	"Your 7% annual estimated net growth *has significantly under-performed* 15% in the NASDAQ, 11% in the DOW and 13% in the S&P 500."
"What have been my upside opportunities and downside risks?"	Calculation of 95% confidence intervals around unadjusted historical growth curve	"In a typical trading month, your portfolio will reach a peak of 10% growth on one high-performing day. On the other hand, it will typically suffer a one-day, 10% loss."
"How do these risks and opportunities compare to the market?"	Calculation of 95% confidence intervals around user-selected market benchmark(s)	"Compared to an estimated average one day a month upside/downside of 2% in the NASDAQ you have assumed 5 times as much risk."
"How much of the growth in my portfolio can be attributed to the general market?"	Calculation of correlation coefficient and beta to chosen benchmark(s)	"About 90% of the fluctuations in your portfolio correspond to fluctuations in the NASDAQ. Typically, your monthly highs and lows overshoot the NASDAQ by 8%."
"**What is the bottom-line analysis of my portfolio's historical performance?**"	Summary of previously referenced statistics	"The 1 in 20 odds you have of losing up to 10% of your portfolio are very high compared to only 2% in your chosen benchmark, the NASDAQ. Your net compound annualized return is only 7%, compared to 15% in the NASDAQ. This return is only 5% higher than you could achieve with a risk-free portfolio of US Treasury notes."

Coaching engine rules repository **216** generates its advice using LifePath data **122** and user insight data **264**. Alternatively the investment portfolio data from the portfolio modeling tool **262** triggers the coaching engines advise. In one embodiment of the invention, user insight data **264** includes transaction history, product or purchase history, as well as demographic information about the user.

In addition to providing coaching to the user, coaching generating subsystem **266** also recommends product solutions to the user. As an example, in one embodiment of the present invention, the advice engines **268** can recommend that the user include deposit products and loan products in their financial plan. For example, the coaching engine **268** can recommend that the user acquire a certain mortgage or bridge financing. Similarly, the coaching engine **268** can also direct the user to the need for financial products such as, home improvement, line of credit, or credit card products. Coaching engine **268** can also have access to product information from various financial institutions (not shown). Accordingly, the user can request additional information about the various products recommended by the system.

The user can access their financial plan or life path model using user terminal **110**. User terminal **110** is part of collaborative computing environment **272** and is in data communication with virtual coach **274** and the advisor terminal **106** through the Internet **104**.

The advice and product solutions generated by the advice generating subsystem **266** are presented to the user through virtual coach **274**. Virtual coach **274** presents the product recommendation with accompanying rationale. The user can test different scenarios by altering the data captured by life path model **256**. Each scenario can then be analyzed by coaching engine **268**. The automated coaching system **114** may include all or some the advice engines **268**, the rule repository **270** and the virtual coaching **274.**

In cases where the user may still feel the need to contact a human advisor, the automated coaching system **114** has already framed the problem for the user and the live advisor. Thus, both can immediately focus on the alternative solutions to the user's issues in a more cost efficient fashion.

Depending on the level of service the user has negotiated with the service level agreement **252**, he may have a multiplicity of modeling tools available in the financial management system. In alternative embodiments of the present invention, modeling tools for analyzing various financial instruments such as bonds, reverse mortgages, option contracts and a

like may be available to the user. In another embodiments of the present invention the user's investment portfolio is modeled by the modeling tool.

Figure 7 is an exemplary graphical user interface **276** that embodies the various concepts and methods set forth for financial portfolio modeling. As shown, the graphical user interface **276** includes a plurality of selection icons **278** including a my page icon **280** for displaying a graphical user interface specifically tailored for a particular user, a save icon **282** for saving any changes made to the graphical user interface **276**, an export icon **284** for exporting data displayed by the graphical user interface **276**, a print icon **286** for printing various fields of the graphical user interface **276**, a help icon **288** for obtaining help information, and an exit icon **290** for exiting the graphical user interface **276**.

My page icon **280** displays a web page that can be customized to each user's need, simplifying the use of the portfolio model **262**. In one embodiment of the present invention, the portfolio modeling system uses the Open File Exchange (OFX) protocol which has become the standard protocol for the exchange of financial information over a wide area network, and particularly the Internet. Thus exported data from the portfolio modeling system into other financial programs is formatted to be easily usable by these programs.

Further displayed on the graphical user interface **276** is a plurality of mode icons **292** for initiating various modes of operation. The mode icons **292** include a transact icon **294** for initiating transactions involving the purchasing and selling of investments utilizing a network, a monitor icon **296** for monitoring the performance of the investments, a model icon **298** for generating an investment model based on criteria entered by the user, an explore icon **300** for retrieving information on the investments, and a track icon **302** for tracking the investments utilizing the network. In the preferred embodiment of the present invention, the Internet **104** has access to outside databases such as Reuters and Bloomberg for historical and current securities pricing or market indexes.

With continuing reference to Figure 7, a communication medium **304** may be employed to converse with other users, namely financial advisers, etc. Such communication medium **304** includes a window **306**, and a plurality of communications icons **308** that enable various types of communication between the user and the live coach or advisor. Access to a live advisor is an optional feature the user negotiates in his service level agreement. However, automated

coaching allows guides the user in most of his decision making and helps him be independent of the need to use a live advisor.

Using the graphical user interface 276, a user profile may be viewed and adjusted using a plurality of profile icons 310. A filtering field 312 is also shown in Figure 7. Such filtering field 312 includes a plurality of companies and associated risk levels and industries which are displayed in accordance with the user's appropriate tolerance to risk and investment style. A risk/reward map 314 is also shown displaying the probability of the user reaching its financial goals. Also shown is a coaching window 316 for displaying coaching strings 318 based on a rule-based automated coaching engine. Such window 316 may include a field adjustment bar 320 in order to facilitate viewing of the coaching strings 318.

The coaching appearing in the coaching window 316 is dynamically related and customized to the user's portfolio characteristics. In an embodiment of the present invention a compound growth factor is calculated for the user's portfolio, by logarithmically averaging the portfolio's growth over the selected period of time as shown by the risk/reward map in the window 314. The risk/reward map 314 is interpreted by the coaching engine and displayed in natural language coaching strings in the coaching window 316 and suggest possible ways of reducing risk and increasing return on the investment.

Further features associated with the graphical user interface for the portfolio modeling include an information window 322 which illustrates various charts pertaining to sector diversification and other investment parameters. In one embodiment of the present invention, the sector diversification information is explained using the automated coaching 114. A portfolio model window 324 may also be displayed for portfolio modeling purposes. For example, interest sensitive stocks conforming to the user's investment parameters are suggested by the automated coaching 114 to counter-balance stocks with the opposite Beta value or less sensitive to interest rate fluctuations.

The service icons 326 are selected by the user when he needs various operations to be performed on his portfolio. The optimize icon 328 optimizes a securities list based on the newly specified criteria. The criteria icon 330 enables the user to introduce additional criteria for selecting a particular security. The trade list 332 displays the system recommended securities that should be sold based on the user criteria and his personal financial parameters. The filter icon 334 generates a filtered list of securities displayed in the filtered list window 312. Sort icon

336 sorts the list of securities based on a user selected criteria such as alphabetical order. The coaching icon 338 generates context sensitive automated coaching 114 related to the user's financial portfolio. The undo icon 340 undoes a specific swap of securities. The submit icon 342 submits and the user changes to his portfolio during the current session.

The user can set a target goal for his investment portfolio as well as his preferences by selecting the target and preference icon 344. He may do an analysis on his past or present portfolio by selecting the portfolio analysis icon 346. He may trigger specific coaching on specific a security or group of securities or even on whole industry sectors, as well as request more detail information by selecting the stock analyst icon 348. He may further model and analyze the effect of inclusion or exclusion of particular securities on his portfolio by swapping stocks in and out of the portfolio 350. When selecting a particular icon corresponding to the various tools, a corresponding help text string appears in the help screen 376, directing the user on how to use the particular tool.

Figure 8 illustrates an investment portfolio management method utilizing an automated coach in a network based financial framework. First, in operation 354, a plurality of parameters is set for a subject utilizing a network. The parameters include personal investment parameters 356, personal financial parameters 358, and/or asset mix parameters 360. Such parameters may include a minimum retirement, target floor, investment rate, tax implications, etc. In operation, the parameters may be selected manually by the subject using a desired graphic user interface, or by a third party.

Next, the network is utilized to provide the subject coaching from an investment coaching engine in operations 362, where such coaching relates to the setting of the parameters. The coaching may be provided by utilizing a look-up table which is capable of generating various combinations of advice based on the settings. In the alternative, the advice may be generated using any other type of artificial intelligence system.

At least one financial model for a portfolio of the subject is subsequently generated in operation 364 based on the setting of the parameters. This may be generated using a system similar to that which generates the coaching, or any other desired means. The network is again used to provide coaching from the investment coach engine to the subject with the coaching relating to the generated financial model.

As shown in Figure **8**, the personal investment parameters include a risk tolerance parameter **366**. Further, the coaching by the coaching engine **368** may provide a textual risk tolerance profile for the subject based upon an interpretation of current risk tolerance parameters of the subject as textual analysis.

Further, the personal investment parameters may include an investment style parameter **370**. In such embodiment, the coaching by the coaching engine **372** provides a textual investment style profile for the subject based upon an interpretation of current investing style parameters of the subject as textual analysis.

In yet another embodiment of the present invention, the personal investment parameters include a bull/bear attitude parameter **374**. A bull attitude is one of optimism that the stock market will go up, while a bear attitude is where the user believes the stock market would go down. In the present embodiment, coaching by the related coaching engine **376** provides a textual description of an implied future of financial markets and graphs showing forecast curves of financial markets based upon the building of financial market forecasts which are, in turn, based upon evaluations from financial experts.

In one embodiment, the coaching by the coaching engine **378** relating to the setting of the personal financial parameters in operation **380** provides an alert if the investment parameters of the subject conflict with LifePath cash flows or personal parameters based on a consistency check of the investment parameters with data obtained from a LifePath model **256** and personal investment parameters.

With continuing reference to Figure **8**, the coaching by the coaching engine **382** relating to the setting of the asset mix parameters in operation **384** provides a rationalization of the asset mix based on personal and financial parameters of the subject and at least one computer generated asset mix. No penny stocks would be included if the subject is conservative, only treasury bills. A pie chart may also be included that represents a portfolio showing the subject's assets.

In still another embodiment, the financial model comprises a model of an existing investment portfolio of the subject. Note operation **386**. The coaching by the coaching engine **388** provides an analysis of market-related growth by security and sector, trend analysis, fee and service analysis, and/or dividend and interest impact based upon transaction history and current market values of the existing investment portfolio. The coaching by the coaching engine **388**

may also provide an analysis of growth, risk and value of the existing investment portfolio based on market data and expert analyst opinion.

Still yet, the coaching by the coaching engine **388** may provide an evaluation of the existing investment portfolio relative to the personal and financial parameters of the subject based on a comparison of growth and volatility projected forecasts to the personal and financial parameters of the subject. It should be noted that similar capabilities may be provided using a model based on a computer generated portfolio in operation **390**.

In operation **392**, the financial model may include a model of an investment portfolio of the subject generated by the subject with the input of a private banker. Coaching by the coaching engine **394** provides an analysis of growth, risk and value of each security in the investment portfolio based on a concatenated, user-friendly English format of market data and expert analyst opinion obtained utilizing the Internet **104**.

Further, the coaching by the coaching engine **394** may provide an evaluation of the contributions of securities in the investment portfolio relative to the personal and financial parameters of the subject based on a comparison of the personal and financial parameters of the subject to an analysis of risk compliance, growth, and volatility.

The LifePath and investment portfolio modeling systems mentioned herein is further described in the related U.S. applications titled Financial Portfolio Risk Management, attorney docket number AND1P756, A Financial Planning and Counseling System Projecting User Cash Flow with attorney docket number AND1P758, Financial Modeling and Counseling System, attorney docket number AND1P755, Communication Interface For A Financial Modeling and Counseling System, attorney docket number AND1P757, and A User Interface For A Financial Modeling System, attorney docket number AND1P759, all by the same inventors as the present application, and all filed on the same day as the present application and herein incorporated by reference.

Currently, risk management is a vague area which advisors and clients typically address using judgment and intuition. Advisors and brokerage firms need to quantify risk to mitigate legal liability. In addition, investors want to quantify the impact of individual picks on their portfolio risk/reward. Further, regulators will be supportive of processes that help investors to become more knowledgeable about risk and avoid unaffordable losses. Finally, the brokerage

industry needs to outsource risk management services to avoid any additional technology problems and to ensure third party objectivity.

Many investors build their own spreadsheets to understand their portfolio performance. The present invention provides automated coaching and new tools to benchmark portfolio performance, and by providing analysis the user is helped in improving his portfolio performance and reduce his risk exposure. The present invention accomplishes this by coaching the user in setting up a user profile based on the user's personal investment parameters **356**.

Figure **9** is a flow diagram illustrating the set risk tolerance operation **366** in greater detail. Once the user starts at **396,** he is prompted for the security type to be used for risk profiling **398**. Next, an iteratively negative financial scenario is presented to the user and he is asked if he wants to bail out once confronted with this scenario **400**.

The negative scenarios presented to the user are generated by the automated coaching **114** and may include scenarios such as negative news related to a particular security and the company's future growth or performance and profitability. Faced with this situation, the user may decide to hold on to the particular security or sell and bail out. In one embodiment of the present invention the representations may include both textual and graphical representation, and may further include headline news indirectly related to the particular company. Alternatively, the scenario generated may encompass as whole sector or industry such as the interest sensitive construction industry. Both indirect economic news such as a forecast of future interest rate and direct economic news such as declining housing starts or sales of new homes are presented to the user and his reaction to the negative news is indicative of his personal risk tolerance. If the user selects to bail out **402** based on the negative financial scenario, his risk tolerance profile is adjusted accordingly **404**. If the user refuses to bail out, he is confronted with iteratively more negative market scenarios **398** scenario and again he has the option to bail out **402**. Depending on when the user selects to bail out **402**, the system adjusts the user risk profile for that security type **404**. The process is repeated for other types of investment such as Retirement, Tax deferred environment. At the end of this process, the automated coaching generates coaching to describe the user's risk tolerance profile at **406** and the process is completed at **407**.

Figure **10** is block diagram of the "generate coaching to describe risk profile" operation **406** of figure **9**. After the user's risk tolerance is initially set, the risk tolerance parameters are

fed to the coaching engine an operation **408**. The coaching engine algorithm interprets the risk tolerance parameters and forms a textual analysis **410**. The coaching engine presents to the user the resulting interpretation of the risk tolerance profile in a textual format **412** and the process is complete.

As an example, the coaching engine can explain in textual language, to the user the significance of the risk tolerance parameter and how the coaching engine would use this parameter to analyze the user's portfolio, and assess whether the existing portfolio conforms to the user's risk tolerance parameter. Furthermore, the coaching engine uses the risk tolerance parameter to suggest securities to be added to the user's portfolio to reduce its risk vulnerability. If the user is not happy with the result of the risk tolerance, the process **366** of figure **9** can be repeated.

The present invention preferably provides risk management and reporting capabilities for personal investment portfolios, e.g. stocks and bonds. The present invention allows customers to be able to quantify the risk associated with their equity holdings for the first time. Currently risk management for personal portfolios is based on judgment and intuition. The brokerage industry is currently facing a number of challenges and opportunities related to this. Too many optimistic self-directed investors are assuming levels of risk they are not aware of and cannot afford. As well, regulators are concerned about the lack of controls in the trading environment potentially resulting in widespread losses and liability litigation.

Figure **11** illustrates a flow diagram for determining an investment style **370** in a network-based financial framework. The present technique is intended to not just ask questions, but provide scenarios. It sets up a portfolio of stocks that an investor can trade or not trade on these fictitious stocks, and provides examples of how the stock market can move. The present method develops a profile and helps target information effectively for the particular person. Coaching is strategically designed to keep the risk minimal by avoiding telling what someone should do. Scenarios will also identify areas of weakness in one's knowledge.

In one embodiment, the interactive input exercise may include top down or bottom up test scenarios **416**, trading frequency test scenarios **418**, needs for information and research test scenarios **420**, level of expertise test scenarios **422**, and/or strategic or pragmatic test scenarios **424**. For example, a bottom up investor would start with a vision of the economy and decide what to invest in, and then they would look at one stock at a time and make a decision. Trading

frequency is used by the system to project the user's portfolio performance in the future by taking into account trading cost. Level of expertise scenarios may be used to customize coaching strings and the level of explanation put forth by the automated coaching.

In use, an investment profile of the subject is generated based on the at least one interactive input exercise in operation **426**. Coaching is also provided for the subject based on the generated investment profile. A display may be generated for the subject based on the generated investment profile. Note operation **428**. In one embodiment of the present invention, the user may reject his investment style parameter as presented to him by the automated coaching and go through the process **370** to reset his investment style parameter.

Figure **12** illustrates a flow diagram for the "set Bull/Bear attitude" in operation **374**. The instant aspect of the present invention is able to come to a conclusion about a person. For example, it may determine how confident a person is about the future. Online polling is one technique that allows the present invention to become the basis of a customer's long-term parameters. It achieves a systematic attempt to capture one's perspective on the economy as a whole. First, an expert is selected utilizing a network in operation **430**.

Next, an opinion from the expert is rendered utilizing the network and witnessed in operation **432**. At least one evaluation of the expert's opinion is then received from a subject utilizing the network. Note operation **434**. As an option, the step of obtaining the evaluation may be accomplished by displaying to the subject a plurality of choices for expressing the subject's agreement with the opinion of the expert, receiving a selection of one of the choices from the subject utilizing the network, and storing the selection. In one aspect of the present invention, the plurality of choices displayed to the user may include the following: strongly agree with the opinion, agree with the opinion, neutral to the opinion, disagree with the opinion, and/or strongly disagree with the opinion.

In operation **436**, the subject may be permitted to select at least one other expert utilizing the network after which operations **430-436** of the present invention may be repeated. The evaluation(s) may then be aggregated from one or more subjects, as indicated in operation **438**.

Thereafter, in operation **440**, at least one financial model may be built based on the aggregated evaluation from the subject. As an option, the financial model may be selected from a model based on the future of a financial index, a model based on an interest rate curve, and a model based on a gross domestic product (GDP). Further, the financial model is displayed in

operation **442** utilizing the network. In one aspect of the present invention, the subject may be coached utilizing the network. See operation **444**. Such coaching may be based on the financial model. The coaching would analyses the user's market attitude (bull/bear attitude) and explain the resulting market model in natural language. The resulting market attitude would be used by the modeling and coaching engines to project the user portfolio's growth over a period of time. Once the user has quantified his market attitude through operation **374**, he presented coaching advice that includes the user's market attitude in all future analysis.

Figure **13** represents the flow chart for setting the personal financial parameters **358**. Once personal investment parameters have been identified, the user is prompted to input some basic personal financial parameters. Unlike the Personal Investment Parameters, which are largely qualitative, the Personal Financial Parameters **358** are quantitative.

First the user is prompted at **446** to input some basic financial data such as his time frame or his investment horizon, his target and current portfolio value and his planned rate of contribution to his investment portfolio. The user also preferably inputs such other personal parameters such as whether the portfolio is a tax exempt IRA, 401K or Canadian RRSP. Note operation **446**. One important datum is the "floor." In a retirement portfolio this would be the bare minimum acceptable lifestyle the customer would be prepared to accept. Some of the data may be imported from other models such as the LifePath model **262**. Note operation **448**. The automated coaching engine checks for consistency of the personal financial parameters **358** with the LifePath model **262**, and personal investment parameters **356**. Note operation **450**. If the consistency check yields a conflict **452**, the user is alerted **454**. If no conflict is detected then the coaching engine confirms the personal financial parameters **456**.

A risk modeling algorithm is used for analysis and projects the portfolio value forward compounded at its current rate of growth. Surrounding the forecast line there is risk bands showing best and worst case scenarios given the aggregated volatility of all contained securities. The bands are preferably defined for example, by Bell curve theory and represent a sigma value related to the confidence level the customer requires in the forecast. The greater the confidence required, the wider the bands. If the "floor' value ends up within the bands, the customer is at risk of an unacceptable retirement. The customer can settle for less confidence in the portfolio projection. He may also optimize a portfolio that hits the target with lower risk using the automated coaching to guide him. He may further accept a lower target at lower risk and

rebalance his portfolio. He may simply lower his "floor" or decide to increase his contribution. Once the user's personal investment parameters and user's personal financial parameters have been established, the system sets the asset mix **360**.

Figure **14** is a flow diagram for process of setting the asset mix coaching operation **382** of figure **8**. First the automated coaching imports the user's personal investment parameters **356** and the user's personal financial parameters **358**. Note operation **458**. Next, the automated coaching creates a computer-generated asset mix based on the user's parameters and the user's parameters **460**. As an example, the automated coaching taking into consideration the user's risk tolerance and investment style parameters, suggest a possible asset mix between stocks and bonds to achieve the user defined target portfolio. The automated coaching evaluates various parameters such as Value At Risk (VAR) and Beta value for the computer generated asset mix and evaluates these variables against the user's personal investment parameters **356** and the user's personal financial parameters **358**. Note operation **462**. The automated coaching outputs to the user the rationalization of the computer generated asset mix in textual natural language coaching strings **464**.

The automated coaching helps the user achieve his financial goals by directing him to modify his portfolio to increase his return on investment and reduce his risk. Three portfolio tools use the personal and financial profile parameters as inputs. A tool is used to create a customized portfolio automatically. It creates an ideal proportional breakdown of security types based on the customer's personal and financial investment parameters. Creating a set of filters, it then selects appropriate securities of each type at the right level of risk and volatility, validates the aggregated growth and volatility, and iterates if necessary. The tool could be used by the customer or the modeling system on the customer's behalf by automatically analyzing the user's existing portfolio. Alternatively, a tool may be used to allow the customer to exchange securities in and out of his portfolio with guidance from the automated coaching system. Also, a tool may be used to generate a computer generated portfolio based on the user's investment parameters.

Figure **15** illustrates a flow diagram for modeling an existing financial portfolio **386** figure **8**. First, the performance of at least one investment of a subject is determined utilizing a network. As shown, the performance of the investment includes obtaining a transaction history of the investment in operation **466**, obtaining a current market value for the investment in operation **468**, and analyzing the performance of the investment based on the transaction history

and the current market value of the investment. Note operation **470**. Next, financial information is obtained relating to the investment of the subject. The step of obtaining the financial information relating to the investment may include obtaining historical data on the investment in operation **472**, and obtaining research relating to the historical data of the investment in operation **474**.

With continuing reference to Figure **15**, the aggregated growth and volatility of the investment is calculated in operation **476**. Such calculation may be performed based on bell curves, and other statistical techniques. Best case and worst case scenarios may also be produced.

A projection to a target date is subsequently built for the investment. Note operation **478**. This is done based on the determined performance of the investment, the financial information relating to the investment, and/or the calculated aggregated grown and volatility of the investment. Finally, displays are generated based on the built projection. Note operation **480**.

As shown in Figure **15**, coaching and a report **482** may be provided to the subject utilizing the network based on the determined performance of the investment. This may include comparing the user's portfolio to market benchmarks and pinpointing the source of the portfolio's volatility or underperformance, by sector or even by specific security. Further, coaching may be provided to the subject utilizing the network based on the obtained financial information relating to the investment. Note operation **484**. Such network may also be used to provide coaching in operation **486** with the generated displays relative to personal and financial parameters of the subject.

Table 2 details the performance of the coaching engines in analyzing an existing portfolio.

TABLE 2

Coach	Inputs	Algorithm	Outputs
Model Existing Portfolio: Analyze Performance to Date	• Transaction history • Current market values	• Isolate market impact from sale/purchase impact • Breakout by security type • Calculate portfolio trends • Calculate impact of fees, etc.	• Analysis of market-related growth by security type, by sector • Trend analysis • Fee, service analysis • Dividend & interest impact
Get Research	• Market data feeds • Expert analyst opinion	• Convert raw data to syntactic textual analysis • Integrate expert opinion (text)	Provide growth, risk & value analysis of current portfolio, for each security
Generate Display	Growth & volatility projection	Compare forecast to personal & financial parameters	Evaluation of portfolio relative to personal & financial parameters

Once the user's present portfolio is analyses the automated coaching is used to rebalance the portfolio, and improve its performance.

Figure **16** illustrates a flow diagram of a process **392** of figure **8** to rebalance a portfolio with the aid of the automated coaching. In the first step the modeling system creates a portfolio model using either an existing portfolio or starts with a computer generated portfolio **448**. Next the user selects security from the list of filtered securities for possible "swap" or exchange with securities already in the portfolio **490**. The securities are filtered based on the user's personal investment parameters **356** and the user personal financial parameters **358**. For example, securities with higher Value At Risk coefficient than the permissible user risk tolerance are rejected. Securities are selected from user preferred industry sectors such as electronics or transportation. The system obtains historical data, technical and fundamental data, and research and breaking news or expert opinion, all pertaining to the particular security **492**. The coaching engine converts the data into natural language, non technical coaching strings **496**. Automated coaching provides analyses of the technical and fundamental data and provides growth, risk and value analysis for each security selected **494**. After the automated coaching output, the user may elect to do a "trial swap" of the security and observe the impact of the swap **498**. The modeling